

ABSTRACT

A species transfer device in communication with at least two streams, one stream having a higher potential of a species than a lower potential stream. The species transfer device is capable of removing a portion of the species from the high potential stream, and transferring the removed species into the low potential stream. The species transfer device incorporates a housing assembly, exchange matrix and optionally, a sorbent. The housing assembly contains both the exchange matrix and optionally a sorbent inside a housing enclosure and between a sealing enclosure, and provides for the entrance and exhaust of the first and second streams therethrough. The exchange matrix can be, but need not be, in the form of a wheel having an average linear coefficient of thermal expansion at 25 to 800° C of less than about $20 \times 10^{-7}/^{\circ}\text{C}$. The housing assembly with the housing and sealing enclosures enables the species transfer device to run efficiently through a range of pressures. The sealing enclosure can include drive hex spoke plates that cap the ends of the exchange matrix wheel, and a compression subassembly to maintain the hex spoke plates in compressive communication with the ends of the wheel.